Comments on the Chesapeake Bay TMDLs
Docket Number EPA-R03-OW-2010-0736
County of Spotsylvania

The County of Spotsylvania ("Spotsylvania") respectfully submits the following comments regarding the draft Chesapeake Bay Total Maximum Daily Load ("TMDL") for the consideration of the U.S. Environmental Protection Agency ("EPA") in finalizing the TMDLs.

EXECUTIVE SUMMARY OF COMMENTS

The Clean Water Act (CWA), 33 U.S.C. 1251 et seq., serves as the foundation for efforts to preserve, protect and restore water quality in the Chesapeake Bay. The Act states as its objective, "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters". Furthermore, the Act declares that "it is the national policy that a major research and demonstration effort be made to develop technology necessary to eliminate the discharge of pollutants into the navigable waters, waters of the contiguous zone, and the oceans". The CWA, which is administered by the EPA, sets the tone for water protection efforts in the United States. It is in furtherance of the CWA's principals that the EPA has developed the draft TMDLs.

However, while the motivations and goals behind the EPA's development of the draft TMDLs are worthy and legitimate goals, the methodologies utilized by EPA to develop the draft TMDLs "pollution diet" are too restrictive in approach and focus on arbitrary numbers instead of documented impact to nutrient levels. Water quality is a field which is constantly striving to develop new innovations and ways to approach old problems. The pollutant problem requires inventive analysis and "out of the box" thinking. While the methods advanced in the draft TMDLs may be one viable option, the EPA cannot be certain that there do not exist other approaches that achieve the same or greater objectives with less of a financial burden to localities. The EPA has not adequately demonstrated what levels constitute a "healthy" Chesapeake Bay, nor what the normal variability in these levels is, nor what are healthy levels in similar estuaries. In basing the "health" of a waterway on numbers which are scientifically unsound because they are constantly changing (and in many cases no longer current), and evaluating the success of a water quality management program on achieving those distorted numbers, the draft TMDLs limit the ability of innovators in the field to continue to strive to find new, creative, and more cost effective pollution control methods to address stormwater and wastewater impacts to the Chesapeake Bay.

Moreover, the EPA has failed to provide the public with sufficient data and documentation needed to review, evaluate, and fully comment on the proposed allocations. What information and data that is available show that the model and model inputs are lacking in the level of precision that should be required of regulatory action with consequences as significant and widespread as the Chesapeake Bay TMDL.

Most notably, the Phase 5.3 model used to derive the proposed allocations is new, untested, and flawed, in its rush to establish the TMDL by an artificial deadline; EPA has proposed draft allocations without first calibrating the model and verifying the accuracy of the model predictions. In fact, EPA has effectively acknowledged that the model and model inputs are incomplete by announcing its intention to conduct additional model calibration after the TMDL is established.

Although the proposed backstop allocations reflect the difficulty of achieving significant load reductions from the agriculture and onsite septic sectors, they fall far short of reflecting the difficulty of achieving such reductions from the urban runoff sector. EPA appears to simply assume that the reductions can be achieved because MS4s are subject to federal and state permitting authority under the NPDES, but this assumption fails to recognize that the Localities own, on average, only about 20 percent of the land area within their respective jurisdictions. Therefore, most of the retrofits needed to achieve the load reductions will have to be implemented on private lands over which the Localities have no control in the absence of new development or redevelopment requiring local land use approvals. Eminent domain costs resulting from these requirements will be substantial.

Lastly, it is interesting to note that, in the past, both state and local agencies have made requests to EPA that permits and inspections for the Virginia Stormwater Management Permit (VSMP) be regulated by the localities. EPA has historically flatly refused these requests. However, today the story has changed and the draft TMDLs are mandating a shift in the program responsibilities to localities. Unfortunately, EPA's deadlines fail to provide localities with the time necessary to adequately train staff and educate the public.

I. INFORMATION REGARDING THE COUNTY OF SPOTSYLVANIA

A. Spotsylvania divides into two (2) distinct watersheds the Rappahannock River and the York River. The current MS-4 permits fall within the 02080104-E20- RA46 (Hazel Run) and RA47 (Massaponax Creek)

B. Spotsylvania's MS4 Programs – Spotsylvania has an MS4 permit for Hazel Run and Massaponax Creek. Both sub-watersheds list low pH and bacteria/fecal however, Spotsylvania owns no Municipal Storm Sewer Systems within Spotsylvania's boundaries. Spotsylvania at the time of the MS4 application did not reach the minimum population required and at present each watershed of our MS4 still does not meet the required population.

C. Factors Affecting Storm Water Control in Spotsylvania – Spotsylvania is approximately 412 square miles (263,680 acres) with 32,319.38 acres within our primary settlement district ("PSD") located within the northern portion of the county next to the City of Fredericksburg. Located next to Lake Anna there is an approximate 1390.27 acres also designated as a PSD for a combined total 33,709.65 PSD within the county. The naturally occurring low pH has made simple E&SC measures ineffective for long term maintenance of any facility. In light of the low pH has promoted extensively the use of innovative stormwater designs including all forms of LID currently available.

D. Spotsylvania County Specific Factors of Concern – Spotsylvania's current TMDL 303d list shows low pH as a contributing factor that must be corrected. In The letter from Dr. Daniels of Virginia Tech (previously shared with EPA) clearly states that Spotsylvania is the first locality, outside of a mining community, that has such a low naturally occurring pH. Spotsylvania's soils make up the five (5) major acid soils and approximately 90% of the soils contain a pH reading of less then neutral. Of those soils approximately 80% are below the acid level of a battery. Under the draft TMDLs, Spotsylvania could never achieve compliance because of our inability to correct a naturally occurring condition. Additional testing is also needed to provide detailed DNA for bacteria obtained for the TMDL because several of the watersheds are still in the same natural wooded state since the formation of the county in the 1700's. These watersheds have had minimal development pressures, as compared to, urbanized communities.

E. The Socio-Economic Impact of the Proposed Urban Runoff Allocations – Although a precise calculation of the cost of the proposed TMDLs is beyond the staffing and financial resources of the Spotsylvania, one likely effect would be to prevent any development or redevelopment within Spotsylvania. The long term effects of that would be to strangle Spotsylvania's vitality. The short term effect would be litigation challenging Spotsylvania's ability to impose the draconian standards required under the TMDLs.

II. EPA HAS FAILED TO PROVIDE SPOTSYLVANIA WITH SUFFICIENT TIME TO REVIEW, EVALUATE, AND COMMENT ON THE DRAFT TMDLs

Despite the enormous size and complexity of the TMDL documents released on September 24, 2010 the socio-economic consequences of the proposed allocations, and the arbitrary nature of EPA's decision to establish the TMDLs by December 31, 2010 when it could have given the public additional time to comment had it taken advantage of the May 2010 deadline in the consent decree, Spotsylvania does not have sufficient time nor staff to adequately review and respond to the draft TMDLs in detail. Spotsylvania will defend vigorously any claim of waiver due to failure to submit comments to the TMDLs on the basis that insufficient time was given to adequately respond.

III. OVERVIEW OF MODELS AND MODELING USED TO DERIVE THE PROPOSED URBAN RUNOFF ALLOCATIONS

The EPA models assume that urban development and agricultural activity caused the currently observed levels of phosphorus, nitrogen, and sediment in the Chesapeake Bay. Having assumed a cause, the EPA went out and found data to support the assumption. Whether or not some other cause would have explained more precisely the effect on the Chesapeake Bay was not investigated. Nor did the EPA examine or consider whether current levels are outside the range of historic variation.

The Phase 5.3 Chesapeake Bay Watershed Model computer model (CBWM) is enormous, and has been described as one of the world's largest environmental models. The

64,000 square-mile watershed spans roughly one-quarter of the East coast of the United States. However, CBWM is only a component in the larger Chesapeake Bay Program suite of models.

Four major modeling components are used to develop the input data for CBWM . A substantial amount of nitrogen is deposited from the atmosphere into the Chesapeake Bay, and land use changes have significant implications for nutrient and sediment loading. All of this data is pre-processed in antecedent models, and then aggregated in a tool called the "Scenario Builder."

IV. EPA HAS FAILED TO PROVIDE THE HOME RULE LOCALITIES WITH ACCESS TO INFORMATION NEEDED TO FULLY EVALUATE AND COMMENT ON THE PROPOSED URBAN RUNOFF ALLOCATIONS

A. CBWM Input Mapping Data

To date EPA has not been able to document the tremendous amount of input data required for the TMDL modeling effort. The Virginia Department of Conservation and Recreation requested mapping from the Chesapeake Bay Program Office (CBPO) that would indicate locations of various urban land use categories (such as Impervious High Intensity, Impervious Low Intensity, Pervious High Intensity, and Pervious Low Intensity) used in the Phase 5.3 TMDL modeling. CBPO indicted that significant effort would be required to produce such mapping. Likewise, there is very little documentation that would allow modelers outside EPA to ascertain how the data was collected and synthesized, which makes working with CBWM a highly unreliable proposition at the state and local levels. More thorough disclosure of documentation is sorely needed, not merely on the model, but just as importantly on the data. Spotsylvania will defend vigorously any claim of waiver due to failure to submit comments to the TMDLs on the basis that EPA withheld pertinent information to evaluate the program.

B. Scenario Builder

The Scenario Builder was supposed to be available to the modeling community as part of the Chesapeake Bay Modeling Program, but has not yet been released outside EPA. Absent the Scenario Builder, modelers must rely on EPA to process the input data to CBWM, and cannot improve the model with local data. In fact, all of the 'modeling' that has been done by the State of Virginia to date is in essence 'post-processing' of EPA modeling results rather than independent modeling.

V. FLAWS IN THE MODEL USED TO DERIVE THE PROPOSED ALLOCATIONS

A. The Phase 5.3 CBWM has not been calibrated

EPA claims that the Phase 5.3 CBWM model has been calibrated. Yet 920 square miles of urbanized land have been erroneously entered as "forest" in the model. A recalibration effort was expected to begin in October 2010 however, this will be an inadequate amount of time to appropriately address the issues by the December 31, 2010 mandated deadline for final publication of the Chesapeake Bay TMDL. EPA has promoted an "adaptive management approach" in developing this TMDL, thereby creating many moving goalpost situations. There are inherent problems with any calibration effort, and CBWM is no exception. There are many ways to fine tune input variables in a complicated model to make the output approximate a series of observed data – a phenomenon known as 'equifinality'.

One indication of calibration problems is with sediment loading computations. CBWM cannot adequately match observed data for sediment loading, which held up the release of working sediment limits to the states until a month before their Watershed Implementation Plans (WIPs) were due. To accommodate the schedule, EPA adopted a "pucker factor" approach in order to sidestep this problem with the model. If the Phase 5.3 model was adequately calibrated, sediment computations could be handled in a straightforward manner.

Many of the draft TMDL limits are targeted to pollutant reduction levels that are considerably less than the margin of uncertainty in the modeling process itself. Dr. Kathy Boomer of the Smithsonian Institute has conducted specific research and concluded that the margin of uncertainty in the TMDL models was much greater than the reductions being sought in pollutant loading. Dr. Ken Reckhow of Duke University (who chaired the Chesapeake Bay TMDL Review Committee for the National Academy) has repeatedly cautioned regulators against reporting modeling results without stipulating the uncertainty. Dr. Reckhow notes that TMDL prediction uncertainty is high, and Chesapeake Bay modelers have had issues with political decision makers being able to understand this uncertainty. Notwithstanding, Section 5 of the draft TMDLs states:

> *"Models have some inherent uncertainty. Because of the amount of data and resources taken to develop, calibrate, and verify the accuracy of the Bay models, the uncertainly of the suite of models is minimized."*

In fact, quite the opposite is true. The amount of data and complexity of the system work to increase the uncertainty, particularly when the source and content of the data have not been disclosed. The above statement from the draft TMDLs cannot be substantiated with vague assurances that the model is based on good, sound or strong science.

It is also interesting to note that the mathematical equation for a TMDL incorporates "margin of safety".

TMDL = Sum of Wasteload Allocations + Sum of Load Allocations + Margin of Safety

While the margin of safety is supposed to account for uncertainty in ensuring that the TMDL is effective, the errors and uncertainties in the computation of the load allocations themselves are not integrated.

There are very few (perhaps only three or four) knowledgeable technical persons with meaningful CBWM modeling experience in Virginia. For a model that will be used as the basis for billions of dollars in regulatory mandates, the technical community lacks the checking and validation that results from widespread use of a model. There is no significant bug reporting and code fixing occurring, and what little modeling is being performed is being done with data that has been distributed from EPA without enough documentation to check its validity. Other computer models, such as the EPA's own Storm Water Management Model (SWMM), have many years of active, widespread use, debugging and code fixes that occur continuously. The user community helps drive improvements that make SWMM a very well understood and reliable model. Conversely, CBWM is essentially an untested and unapplied model in 2010. The development of CBWM is undoubtedly an ambitious and worthwhile undertaking, but reasonable time has to be given to grow and mature CBWM to the point that it can be unfailingly used to justify the significant expense.

B. The Phase 5.3 CBWM does not produce reliable modeling results

EPA distributes the CBWM computer program in un-compiled form, meaning that in order to run the model users must obtain a FORTRAN compiler and generate the executable computer programs from the source code. However there is a known and still unresolved problem with CBWM producing different results when compiled on different computers. Identical input data was run on different computers in August 2010 for the James, York, and Rappahannock Rivers, and CBWM produced significantly different results – with variations as high as 36% in the answers. The reliability of CBWM cannot be confirmed until repeated results can be produced. EPA is working on this problem, but its self-imposed TMDL schedule demands do not provide the time required to produce reliable and scientifically verifiable models and modeling results.

C. EPA is using the CBWM on a scale that is beyond its predictive capability

Due to the 64,000 square-mile extent of CBWM, there is an inherent problem of scale when addressing Best Management Practices (BMPs). CBWM is better suited for overarching computations on larger scales, such as evaluating the effects of fertilizer applications on large segments of the Chesapeake Bay watershed, than it is in evaluating the effects of a particular BMP or group of BMPs on specific sites. EPA staff has acknowledged that the effects of individual, site-specific BMPs cannot be directly addressed in CBWM. Because the model is constructed on such a large scale, numerical effects of BMPs are lumped or aggregated in the modeling input data. This scale problem makes it very difficult for local governments to evaluate the feasibility of costly BMPs such as, filtration devices and detention and retention basins, which will have to be constructed to achieve water quality improvements. A single retention basin can easily cost millions of dollars, yet its effects cannot be directly isolated and evaluated in CBWM.

D. Existing imperviousness is underestimated in the CBWM

The Phase 5.3 CBWM model was prepared based on satellite photography. Early indications from four Virginia municipalities are that the use of satellite imagery has produced estimates of watershed imperviousness that are approximately 20 percent too low, which has significant implications for the amount of pollution that runs off each watershed. Localities have better imperviousness data in their Geographic Information Systems, but the TMDL development schedule did not provide time for EPA modelers to coordinate and collect this information from the localities. The implication is that if existing watershed imperviousness is underrepresented in CBWM, then so will be the existing pollution from urbanized areas. This inaccuracy could easily result in computed TMDL limits that are unattainable because in order to satisfy their "pollution diet," municipalities will have to reduce pollution based on modeling data that assumes they are substantially (20 percent) less impervious than they actually are. In other words, if their "pollution diet" starts by assuming that they have 20 percent less pollution-producing impervious cover than they actually have, then in order to meet their TMDL limits they would have to reduce *all* pollution from that 20 percent *plus* the reductions mandated by the TMDL – which are themselves very difficult to achieve. Refusal to accept more accurate data as the price of meeting an unrealistic deadline sets the County of Spotsylvania up for failure.

E. There is no groundwater component in the CBWM

The absence of a groundwater component to the model is significant because groundwater transport of nutrients is a major source of pollution in the Chesapeake Bay. Ironically, many of the BMPs that will be used to satisfy the TMDLs are based on removal of pollutants by infiltration, which is not addressed in the modeling. This lack of a groundwater component in CBWM means that pollutants that are routed into infiltration BMPs magically disappear from the computational universe – when in reality they are deposited into groundwater that eventually flows into the Chesapeake Bay.

VI. DISCONNECT BETWEEN THE AVAILABLE FACTS AND THE PROPOSED STANDARDS

A. Lack of data

EPA lacks solid data to support a baseline to which the Chesapeake Bay can be "restored." There simply are no historical data on phosphorus, nitrogen, or sediment levels in the Chesapeake Bay except some very limited data over the past few years. For example, although the TMDLs reference oyster levels in 1900 there is no data on phosphorus, nitrogen, or sediment levels in that era. Without reliable data, the causes of current conditions cannot be determined, even using the best scientific methodologies. This scant data as to the normal variability in these levels makes it impossible for the EPA to determine what pollutant levels constitute a "healthy" Chesapeake Bay.

If the EPA has any data regarding comparable estuaries within the continental United States, as well as, contemporary data from elsewhere in the world, it could provide at least some scientific basis for the standards that EPA proposes to impose.

B. Data selected to support the conclusions drawn.

The original data is based upon a small portion of the Chesapeake Bay with minimal reporting summaries. It is not representative of the health of the entire Chesapeake Bay. The information as presented has skewed the results, which has driven the concerns with the data.

C. Lack of explanation for sampling methods.

Section 5 of the draft TMDL lacks background information on the sampling theory used for monitoring the Chesapeake Bay and calibrating the watershed models. Assuming the Chesapeake Bay is no different from other natural features, its characteristics are cyclical. Sampling theory dictates a minimum of two (2) samples per cycle. The reporting monitoring periods have decreased from 20 times per year to 14, but no reason is given as to why this decrease has occurred. It is also not known at what times during the year those monitoring periods occur. If different pollution parameters have different cycles, then the monitoring must account for all the cyclic variations.

D. Known variability less than default allowances.

The TMDL is addressing values that fall within its own tolerance levels for uncertainty. This raises the question whether any regulation whatsoever is scientifically justified.

VII. EPA DOES NOT HAVE THE AUTHORITY TO ESTABLISH A DEADLINE IN THE TMDL FOR ACHIEVING THE LOAD REDUCTIONS

The CWA and EPA's regulations do not give it the authority to establish a 2025 compliance deadline in the TMDLs.

Of all the source sectors covered by the TMDLs, none is affected more by the 2025 deadline that the urban runoff sector because much of the difficulty and cost of achieving the urban runoff load reductions is associated with retrofits independent of redevelopment. Historic re-development rates within the multiple Spotsylvania watershed fall far short of those that would be needed to achieve the load reductions without forcing the locality to acquire the easements needed for retrofits and assuming responsibility for retrofit installation and maintenance.

VIII. RECOMMENDATIONS

Spotsylvania recommends an evaluation of current BMPs to establish the existing conditions base loads that should be controlled by the draft TMDLs. The current information offered by EPA has many potential flaws. The draft TMDLs are based upon dated information that, while useful for planning purposes, is not appropriate for use as detailed requirements and limits.

Spotsylvania also recommends close review of the comments submitted by the Virginia Association of Municipal Wastewater Agencies (VAMWA) and the Virginia Municipal Stormwater Association (VAMSA). These organizations have thoroughly analyzed the far reaching impacts of the draft TMDLs and offer legitimate alternatives to what is currently proposed. Spotsylvania supports the comments of VAMWA and VAMSA, and incorporates them by reference.

IX. CONCLUSIONS

The model results that are the basis for the proposed allocations are clearly lacking in the level of precision and certainty required to justify the significant costs to localities. EPA professes to be taking an adaptive management approach to the TMDLs; but in reality, EPA is taking an adaptive legal and regulatory approach to the TMDLs by establishing the TMDLs based on incomplete and flawed science and then seeking to supply the missing documentation after the fact.

If EPA is truly committed to an adaptive management approach to the TMDLs, it would adopt them based upon the allocations in the Tributary Strategies and then update the TMDLs when the Phase 5.3 CBWM is fully transparent, developed and calibrated to within an acceptable margin of uncertainty.

RESPECTFULLY SUBMITTED,
THE COUNTY OF SPOTSYLVANIA

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